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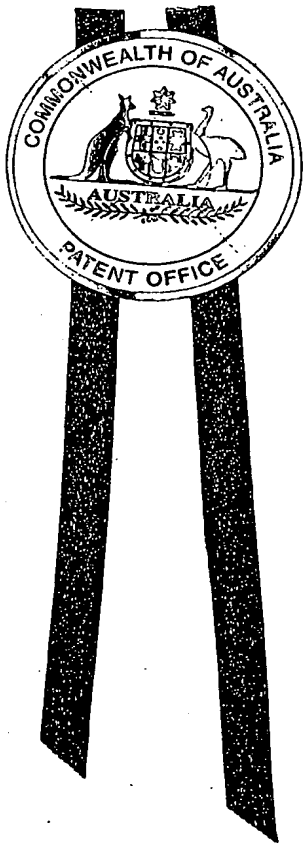

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Twenty-second day of February 2005

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Physical User Interface

Field of the Invention

The invention pertains to computer interfaces and more particularly to a physical interface between a user and a computer.

Background of the Invention

A typical graphical interface (GUI) is not suitable for a young child (and some physically or mentally challenged adults). The amount of information on the display or screen is complex, excessive and the mastery of graphic symbols required to use a typical graphical interface is beyond the grasp of younger children. However, children do have sufficient cognitive skills, spatial orientation and dexterity to use toys such as blocks, toy soldiers and checkers. Equally, a typical GUI often requires fine motor skills and/or good eyesight to launch, position, re-size and close application windows. This can be a source of frustration and strain for users. Additionally, if many application windows are open, a typical GUI will often require a user to close (or minimise) one or more windows in order that the icons used to launch other applications can be seen. This is unproductive.

Objects and Summary of the Invention

The present invention seeks to provide an interface to a computer which is appropriate to the abilities of younger children, the disabled and/or inexperienced or non-expert PC users.

The present invention also seeks to provide a physical and non-textual interface to a computer.

The invention is aimed at average users and children – it need not be suitable for high end experienced PC users.

Accordingly there is provided a device having a case or electronic substrate with a flat work surface on which is located one or more sensors. The work surface is subdivided into regions. The device is connectable as a peripheral device to a computer. One or more uniquely identifiable counters are provided. A counter fits within a region on the work surface (which may or may not be visually defined) and each counter is detectable by a sensor embedded in the region in a way which distinguishes it from other counters on the work surface. Collectively, the sensors can determine which region a counter is in. A signal processor in the device uses the output of the sensors to determine the region of each counter and the identity of each counter and communicates the position and identity data to a control program running on the PC to which the device is connected. The control program turns that output into a second signal which is capable of being interpreted as one or more commands by a computer.

In a further preferred embodiment, the sensor or sensors also detect(s) an orientation of a counter and the signal processor uses the orientation as well as the location and identity data to generate the second signal.

Brief Description of the Drawing Figures

Figure 1 is a perspective view of an example of a physical interface according to the teachings of the present invention.

Figures 2 (a) - (c) are top plan views of embodiments of counters.

Figure 2 (d) is a side elevation of a counter.

Figure 3 depicts perspective views of alternate counters.

Figure 4 is an alternate surface arrangement of a physical user interface.

Best Mode and other Embodiments of the Invention

Broadly and conceptually the invention may be viewed as a hybrid between a graphic equaliser and a magnetic chess board. It comprises the following parts:

As shown in Figure 1, the invention 10 comprises a case 11 having a flat, smooth, impermeable top surface 12. The top surface is subdivided into regions 13. In this example, regions 13 are arranged as a matrix of rows and columns. There is provided a number of counters 14 which can be placed on the surface. A counter 14 fits within a region 13.

An electronic substrate or array of sensors below the work surface (not shown) consists of a mechanism 11 capable of detecting the row and column position of each of the counters 14. Each counter is uniquely identifiable by the sensors in the sense that each counter can be distinguished from every other counter in the set of counters. For this purpose one can use magnetic, optical, Hall effect, capacitance or other technologies which provide the required interaction between counter 14 and sensor, for example, a unique combination of magnets on a lower portion of each counter. The sensor or array or sensors repeatedly scan(s) the surface 11 and if any counter has moved, if a new counter is placed on the work surface or if a counter is removed from the work surface, the device reports the positions of all counters. RFID technology can also be used, with each counter 14 provided with its own RFID chip and the substrate containing a sensing antenna.

The device may be run in series with a USB mouse and may have a spare USB port 15 for this purpose. It may also be run as a stand alone device with an integrated touchpad/trackpoint or other pointing device 16. Its presence will have no effect on the operation of the mouse or other pointing device.

Control software on the PC will allow the user to assign (and re-assign) to each counter an association with an application on the PC. For example, counter 17

might be a browser, counter 18 an email client, counter 19 is a word processing application.

When a new counter (previously unused) is placed on a region 13, the control software will launch automatically and prompt the user to associate the counter with an application.

When a counter that has previously been associated with an application is placed on the surface, the associated application will launch automatically. The action (and consequences) will be identical to a mouse click on a desktop icon.

When a counter is removed from the surface (either lifted off completely or slid to a non-active zone outside the matrix of regions) and has not been replaced within a designated time, the associated application will close automatically. The action (and consequences) will be identical to a mouse click on the 'close' button typically located in the top right hand corner of the application pane.

Moving a counter on a surface of the type exemplified in Figure 1 has the following effects: The horizontal axis (or row position) represents the side to side position of the application window on the PC's GUI desktop. The vertical axis (or column position) represents a) the size of the application window as a percentage of its maximum size; and b) the relative positions (layering) of all open windows. The application associated with the counter highest on the vertical axis will be on top of all other open applications (except and optionally those programmed to be 'always on top').

If the mouse (or other pointing device) has been used to re-arrange the desktop, any movement of any counter will re-set the desktop to the layout described by the positions of the counters.

As shown in Figure 1, a counter 14 may have a base 20 which provides a stable foundation as well as a physical platform for identification hardware such as magnets, bar codes, etc. In this example, a stalk 21 separates a head 22 from the base

20. The head makes the counter 14 easy to handle and provides a top surface which can be used to identify the counter.

As shown in Figure 2, the top surface 23 of a counter may support a miniature display device 24 capable of displaying text or images which identify the counter and its associated application. The surface 23 may alternatively be used to put an identifying label 25 on. The top surface 23 may also have a fixture 26 for receiving user selected three dimensional indicia 27 which cooperate with the surface 23 or fixture 26 and which identify the counter and its associated application.

A shown in Figure 3, a counter may be a cylinder or disk 30 , cube 31, tetrahedron 32 or other three dimensional solid. Solids of this type have a discrete number of stable rest positions associated with its faces. E.g. the cube has six, the tetrahedron has 4 and the cylinder has two.

In a first preferred embodiment a counter will only have one identity, irrespective of which face is in contact with the work surface (or because the counters have a defined 'top' and 'bottom' and cannot be rotated)..

In a second preferred embodiment, the unique identification of a counter will vary depending upon which of its faces is in contact with the work surface. Accordingly, in this implementation, the identity of the counter will include two notional fields – a primary ordinal which will be associated with a single application on the user's PC (as above) and a second ordinal (numbered from 1 to n, where n is the number of significant faces on the solid shape). When the counter is flipped from one face to another, there will be a corresponding action within the associated application. In one example, if the application is a word processor, flipping a cylinder 30 from one flat face to the other causes the associated programme to step or cycle through all open word processing documents. In this case flipping the counter has the same effect as pressing Control F6 on the keyboard. Other actions are possible.

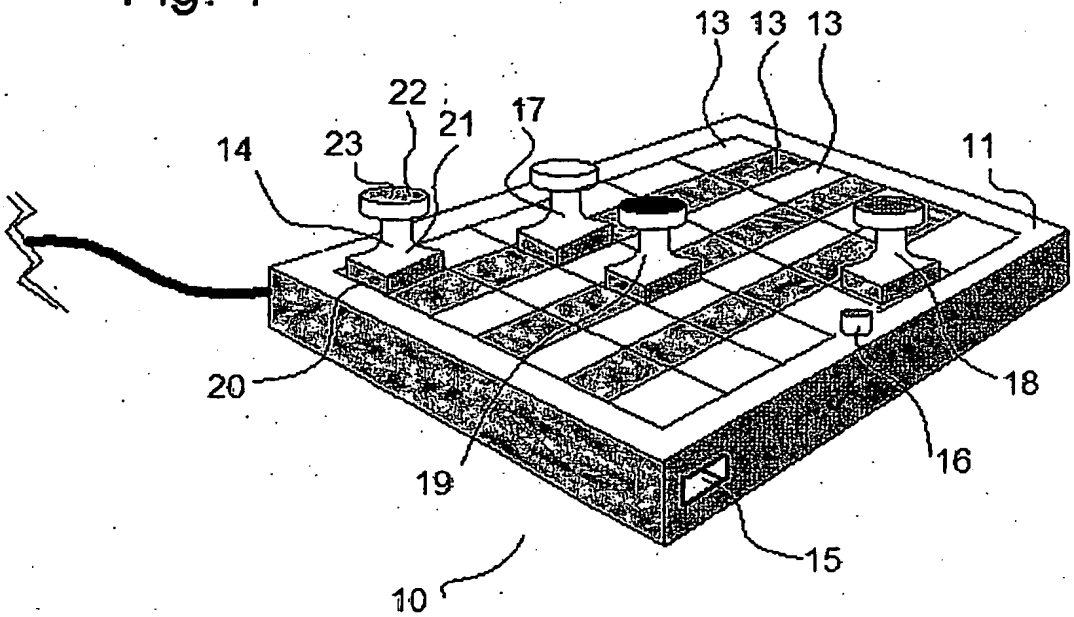
As shown in Figure 4, a surface 11 need not be square or rectangular. A preferred embodiment is a triangular surface 40 subdivided or tessellated into

triangular regions 41 is well suited to the invention because while still having rows 42 for indication of horizontal position and relative GUI window size, there is only one location (e.g. 43) for a counter's associated programme in the GUI to be at full screen and on top of all other open applications.

Irrespective of the shape of the work surface, the bottom row can indicate launched applications running minimised. So too, the work surface can be embedded in some larger surface (and would be designated by a graphic design), allowing the creation of 'inactive areas' (places where there are no sensors) outside the work surface. Counters could then be slid to these areas to terminate running applications and for storage.

While the invention has been described with reference to particular details, these should be understood as having been provided as examples and not as limitations to the scope or spirit of the invention.

Fig. 1



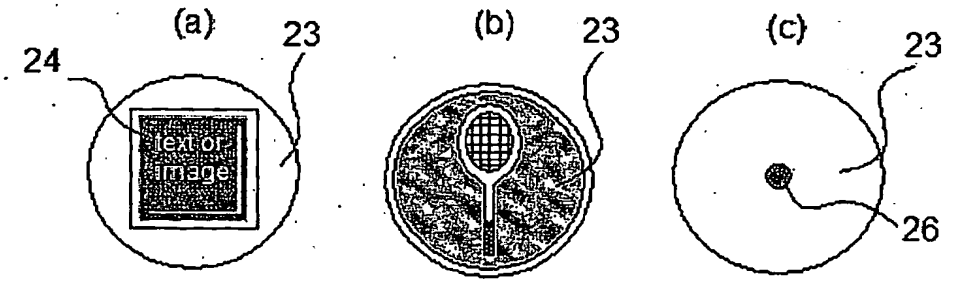
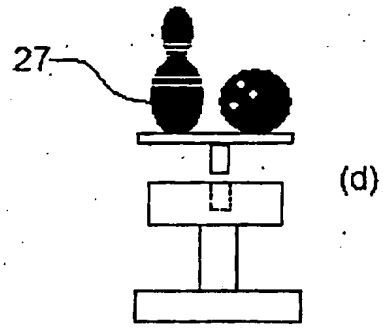


Fig. 2



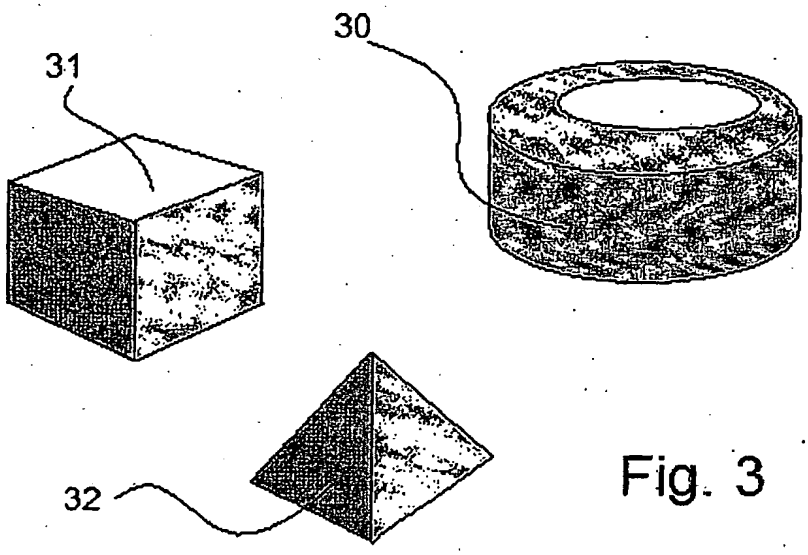


Fig. 3

Fig. 4